



# **EPA/MEW/Navy/NASA All Parties Meeting**

**December 2, 2015**

## Draft Agenda



- **Introductions, Announcements, Distribution List**
- **MEW, Navy, NASA – Regional and Facility-Specific Work Progress Updates**
  - Facility-specific Pilot Tests
  - Highlights of Ongoing / Upcoming Work Activities
- **EPA Groundwater / Vapor Intrusion Work Activities Update**
- **EPA Operable Unit 3 - Work Activities Update**
- **Stakeholder/Community Involvement Meetings and Outreach Activities, Interested Parties Inquiries**
- **Additional Updates/Items**



## EPA Update

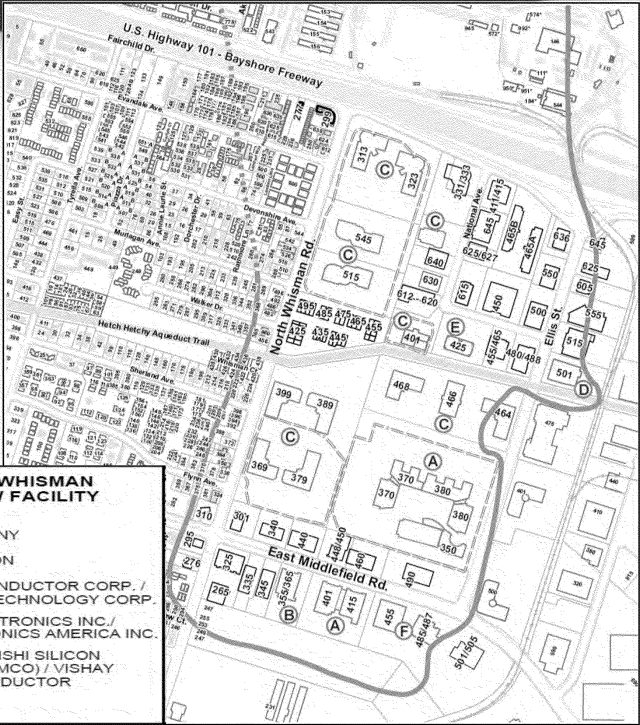


- EPA Vapor Intrusion Work Activities Status – EPA Conditional Approval Site-wide Response Action Tiering Work Plan, Sampling, Meetings, Other Deliverables
- EPA Groundwater Status – EPA Conditional Approval – 2015 Annual Sampling, March 2016 Water Level Measurements, Annual Reporting
- EPA Focused Feasibility Study – EPA Team, Proposed Path Forward, Process, Stakeholder Input

# May 2014 Pilot Test Communication Plan



- MIDDLEFIELD ELLIS WHISMAN (MEW) FORMER MEW FACILITY LOCATIONS**
- (A) RAYTHEON COMPANY
  - (B) INTEL CORPORATION
  - (C) FAIRCHILD SEMICONDUCTOR CORP. / SCHLUMBERGER TECHNOLOGY CORP.
  - (D) FORMER NEC ELECTRONICS INC. / RENESAS ELECTRONICS AMERICA INC.
  - (E) SUMITOMO MITSUBISHI SILICON CORPORATION (SUMCO) / VISHAY GENERAL SEMICONDUCTOR
  - (F) SMI HOLDING LLC





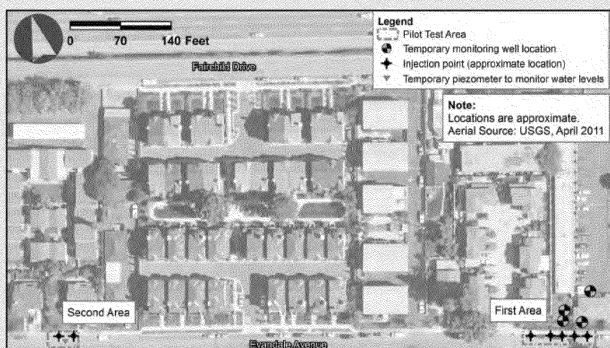
## Middlefield-Ellis-Whisman (MEW) Study Area

U.S. Environmental Protection Agency • Region 9 • San Francisco, CA • August 2014

Mountain View, California

### Field Work Notice for Pilot Test

In February and April 2014, pilot tests using the chemical oxidant sodium permanganate were shown to be effective at significantly reducing a trichloroethene (TCE) groundwater hot spot area (see: "First Area" in Figure 1) located along Evandale Avenue. As a result, additional permanganate injections are scheduled for the weeks of August 11 and August 18. This work will include a final permanganate injection at the "First Area" location, and begin permanganate injection at a



## 2010 ROD Amendment Vapor Intrusion RAO



Focused Feasibility Study Conceptual Framework to address the Vapor Intrusion Remedial Action Objective in 2010 ROD Amendment:

*“To accelerate the reduction of the source of vapor intrusion (i.e., Site contaminants in shallow groundwater and soil gas) to levels that are protective of current and future building occupants, such that the need for a vapor intrusion remedy would be minimized or no longer be necessary.”*

# EPA 2014 Final Third Five-Year Review

## Selected Issues & Recommendations



**Issue:**

Declining efficiency and effectiveness of existing groundwater remedy will not achieve groundwater cleanup levels and will not meet the vapor intrusion remedial action objective to accelerate the reduction of the source of vapor intrusion (i.e., Site contaminants in shallow groundwater and soil gas) to levels that are protective of current and future building occupants, such that the need for a vapor intrusion remedy would be minimized or no longer be necessary for many decades.

**Recommendation:**

Enhance groundwater contaminant plume capture and groundwater cleanup efforts by implementing facility-specific and regional program optimization plans. Evaluate and implement pilot tests and treatability studies of alternative groundwater cleanup technologies to expedite contaminant mass removal and cleanup timeframe and reduce VOC concentrations in different representative source and Regional Plume areas. Complete Feasibility Study to evaluate remedial alternatives that can effectively meet the RAO for the vapor intrusion remedy.

## EPA 2014 Final Third Five-Year Review Selected Issues & Recommendations

**Issue:**

Inward gradients within slurry walls and upward vertical gradients are not consistently maintained at three of the slurry wells.

**Recommendation:**

Evaluate alternative cleanup strategies inside the slurry walls and implement treatability studies that do not require maintaining inward and upward gradients to control facility-specific source area contamination as part of the Feasibility Study process.



## Consideration of NRRB and Stakeholder Comments



- Considering EPA National Remedy Review Board (NRRB) and Stakeholder Comments Received on 2012 Draft Groundwater FS, as appropriate
- Assessing data gaps and what needs to be updated.
- Periodic Updates/Input during Development of FFS

## Focused and Targeted Areas to be Addressed in the FFS



- Focused remediation in Target Zones (e.g., facility-specific source areas, high TCE shallow groundwater, and high TCE soil gas concentration areas).
- Targeted remediation - TCE in “Shallow Zone” (shallow soil/soil gas - vadose zone and shallow groundwater where there is high potential vapor intrusion risk).
- Address access and infrastructure concerns – characterize properties and target high concentrations in “Shallow Zone” during redevelopment, extended vacancies.



## Issues to Be Considered and Addressed in the FFS



- The remedial action of creating inward and upward gradients within slurry walls, as specified under the 1989 ROD, is not consistent with meeting 2010 vapor intrusion remedial action objective and elimination of this action should be considered;
- The effectiveness of technologies to reduce VOC concentration in fine-grained saturated and unsaturated soils in a short timeframe is uncertain; and
- Logistical constraints will be significant and need to be explicitly considered in the evaluation and selection of alternatives.

## DRAFT FFS Outline/Content



- Introduction, Background, Purpose
- Geology/Hydrogeology, Nature and Extent of Contamination
- Conceptual Site Model – Focus on subsurface Vapor Intrusion Potential, Shallow Zone, Preferential Pathways, Migration to Indoor Air
- ARARs, RAOs, and Cleanup Standards - Basis for Soil Gas and Groundwater Trigger Action Levels
  - Level 1 – relatively low levels - passive VI control system is appropriate
  - Level 2 – higher levels where active VI control system is needed
  - Level 3 – highest levels where Shallow Zone remediation is needed

## DRAFT FFS Outline/Content



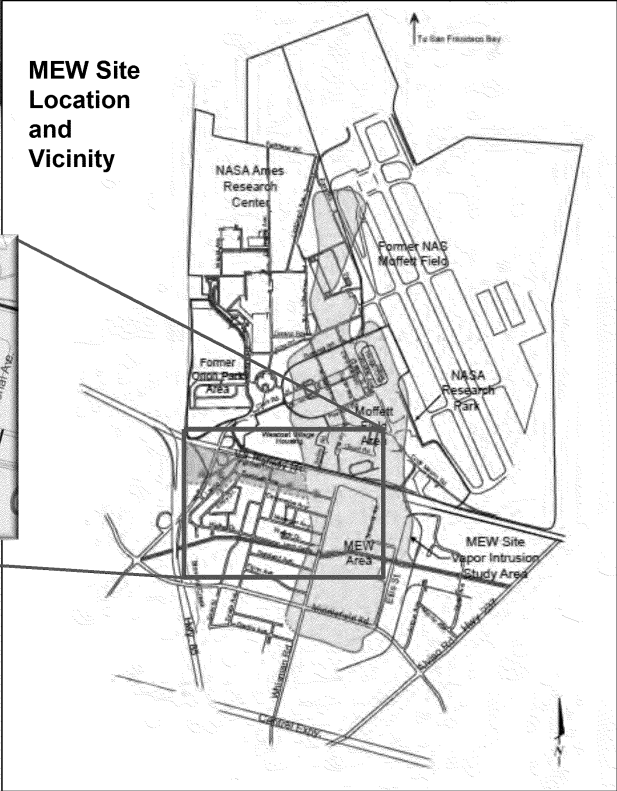
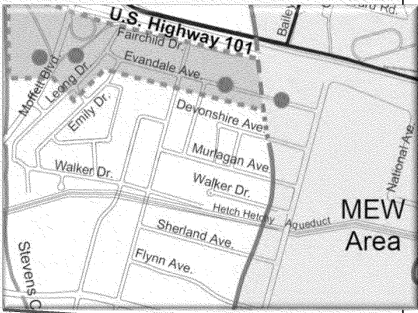
- Screening of Technologies – consideration and identification of significant logistical/access constraints, property-specific conditions, and technical limitations
- Potential Technologies Retained – Optimized P&T, ISCO, ERD, dual-phase extraction, PRB (e.g., convert slurry walls – funnel & gate), MNA, SVE, excavation
- Development of Remedial Alternatives – Common Components (ICs, Characterization during redevelopment, Optimized P&T for lower concentrations outside Target Zone), Combination of Retained Technologies
- Detailed and Comparative Analysis of Alternatives

## Stakeholder Input, Process

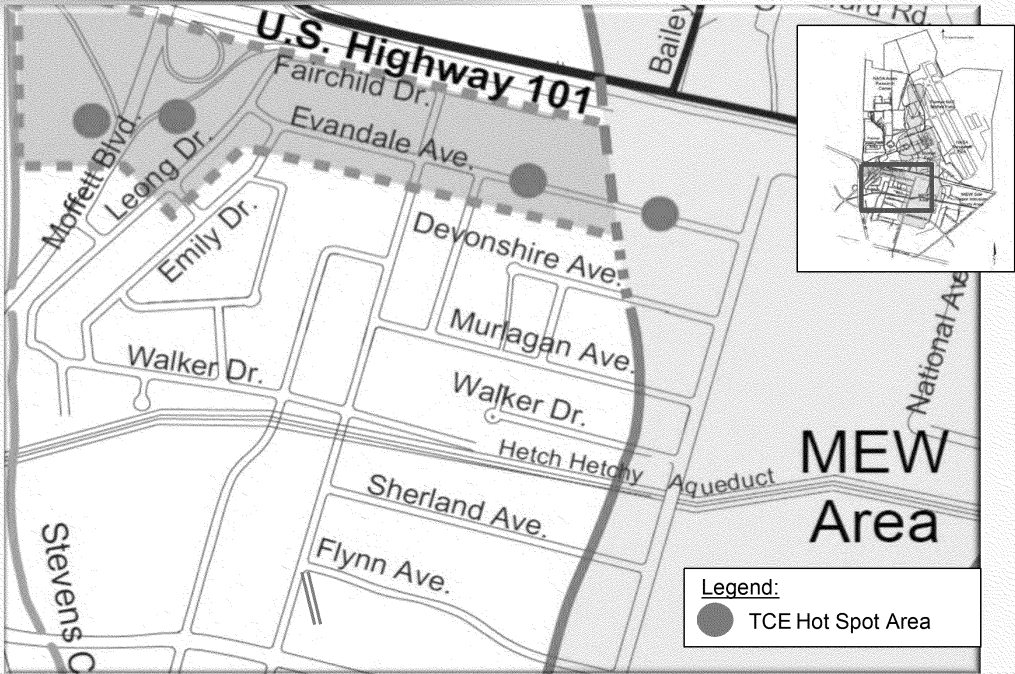


- Outreach to Key Stakeholders on FFS Path Forward.  
*Consider Input from MEW, Navy, NASA, Property Owners, City, Developers, Community Members*
- Focused Workgroup Meetings, EPA requests for data/information to feed into FFS
- Periodic Updates/Input during Development of FFS

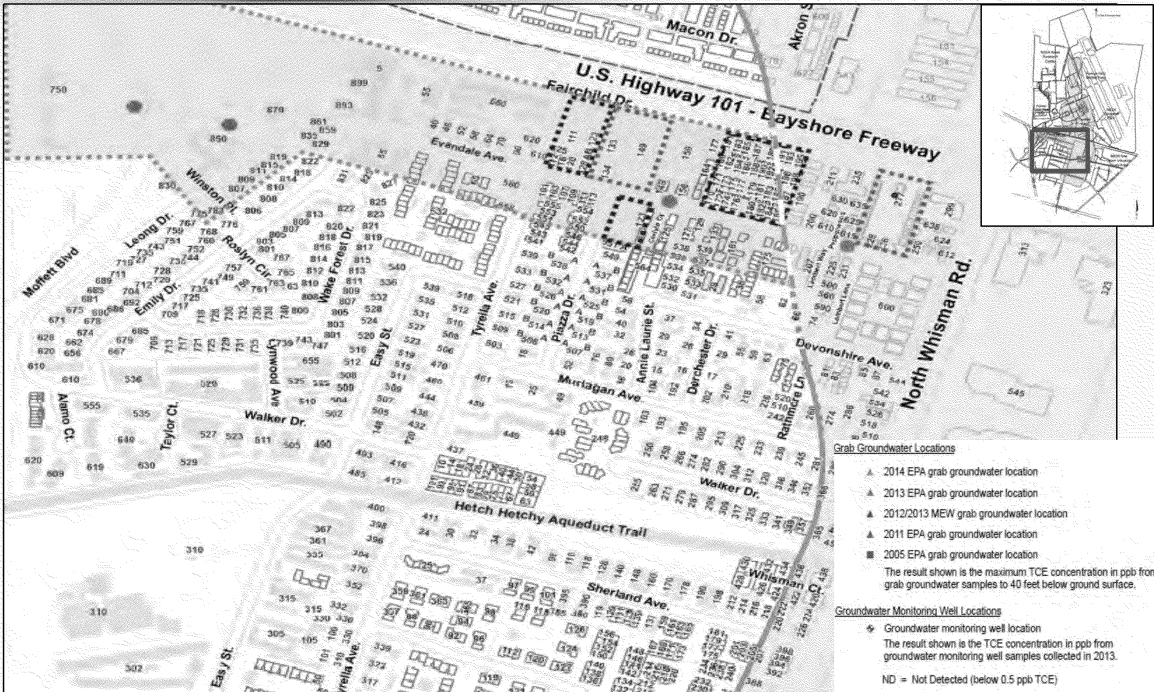
OU3 Vapor Intrusion  
Evaluation Area



TCE Hot Spot Areas and OU3 Vapor Intrusion Evaluation Area



OU3 Vapor Intrusion Evaluation Area - 2015





EPA OU3 Vapor Intrusion Evaluation Area  
TCE Shallow Groundwater Results  
Residential Areas (2005 - 2014)





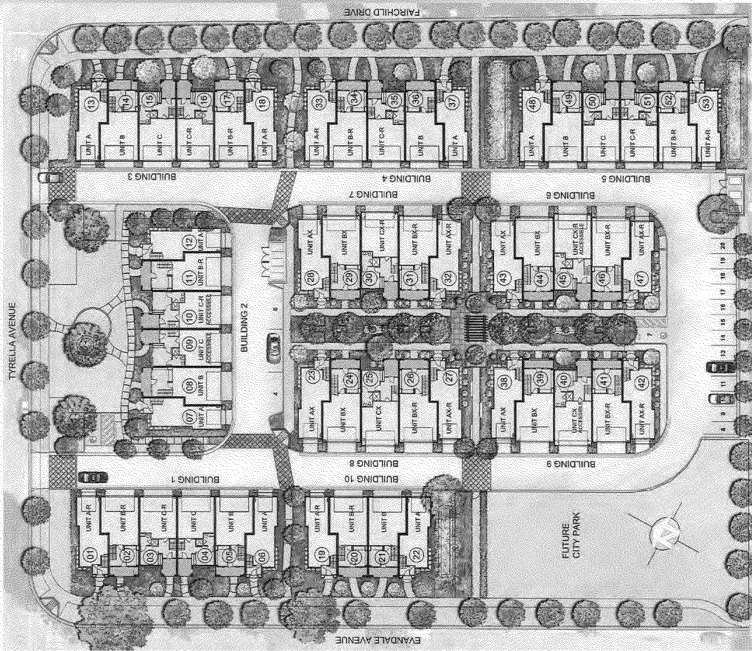


## EPA OU3 - Ongoing Work Activities



- EPA OU3 Investigation is Ongoing – PRP search activities
- EPA OU3 Additional Subsurface, sewer pathway, and vapor intrusion investigation - additional air sampling
- EPA continues to work with developers, City on implementing vapor intrusion remedy for new development within OU3 area

Dividend – Viewpoint Residential  
Development (111-149 Fairchild Drive)



TOTAL FLOOR AREA*	111,546	SF
TOTAL SITE AREA:	109,855	SF
FLOOR AREA RATIO:	1.02	

PARKING		
REQUIRED PARKING:		
2 SPACES PER UNIT	106	SPACES
3/ UNIT GUEST SPACES	16	SPACES
TOTAL	122	SPACES
PROVIDED PARKING:		
(INCLUDES 2 ACCESSIBLE SPACES)	127	SPACES

UNIT DESCRIPTION		
UNIT A	12	UNITS
LIVABLE SQ. FT.	1,294	SF
UNIT INFO:	2 BED + 2 1/2 BA, 2-CAR	
UNIT B	12	UNITS
LIVABLE SQ. FT.	1,673	SF
UNIT INFO:	3 BED + 2 1/2 BA, 2-CAR	
UNIT C	8	UNITS
LIVABLE SQ. FT.	1,704	SF
UNIT INFO:	3 BED + 3 1/2 BA, 2-CAR	
UNIT C AT 5-PLEX	1	UNITS
LIVABLE SQ. FT.	1,722	SF
UNIT INFO:	3 BED + 3 1/2 BA, 2-CAR	
UNIT AX	8	UNITS
LIVABLE SQ. FT.	1,301	SF
UNIT INFO:	2 BED + 2 1/2 BA, 2-CAR	
UNIT BX	8	UNITS
LIVABLE SQ. FT.	1,776	SF
UNIT INFO:	3 BED + 2 1/2 BA, 2-CAR	
UNIT CX AT 5-PLEX	4	UNITS
LIVABLE SQ. FT.	1,945	SF
UNIT INFO:	3 BED + 3 1/2 BA, 2-CAR	
TOTAL:	53	UNITS

\*TOTAL FLOOR AREA INCLUDES ALL ENCLOSED  
FLOOR AREA=LIVING SPACE + GARAGE + ENCLOSURE  
EPA-R9-2017-003246\_0000023

---

# Middlefield-Ellis-Whisman (MEW) Area Update

EPA All Parties Meeting  
2 December 2015

Geosyntec<sup>®</sup>  
consultants

EPA-R9-2017-003246\_0000024

---

# MEW Study Area Update

- Groundwater Remedy
    - The groundwater extraction and treatment systems continue to operate reliably and meet objectives of the MEW ROD
    - The cVOC plume is being captured
    - cVOC concentrations in groundwater are generally decreasing throughout the plume
    - At EPA's request, pilot studies to improve cVOC removal rates are being implemented where appropriate
  - Vapor Intrusion (VI) Remedy
    - Although EPA review of Site-Wide Tiering Work Plan is still pending, MEW Parties have worked proactively to ensure requirements of VI ROD Amendment are met
    - VI response actions continue to be implemented where required
    - New and retrofit sub-slab systems continue to operate reliably and effectively
-

---

# Fairchild Sites Update

## Middlefield-Ellis-Whisman (MEW) Area

EPA All Parties Meeting  
2 December 2015



EPA-R9-2017-003246\_0000026

---

# Topics

- ❑ Former Building 9 (401 National Avenue) in situ chemical oxidation (ISCO) pilot study
- ❑ Former Building 19 (369-399 North Whisman Road) optimization pilot study
- ❑ South 101 treatment system upgrades and realignment of Fairchild System 1 and System 3 extraction pipeline networks

---

# Former Building 9 ISCO Pilot Study

- Purpose is to evaluate whether a series of ISCO injections can significantly and permanently reduce cVOC concentrations
- Pilot study conditionally approved by EPA on 2 January 2015
- Progress to Date
  - January 2015 – injection and monitoring well installation
  - February 2015 – first injection event
  - November 2015 – second injection event
  - Ongoing – periodic monitoring within pilot study area and outside of Building 9 slurry wall



---

# Former Building 9 ISCO Pilot Study

- Pilot study results reported to EPA and other stakeholders on monthly basis
  - TCE concentrations reduced by up to 90% in highest concentration areas after first event
- Planned future work
  - Early spring 2016 – anticipated third injection event
  - Late spring 2016 – submittal of pilot study implementation report

---

# Former Building 19 Optimization Pilot Study

- Purpose is to evaluate whether modifying flow rates in the existing well network will enhance cVOC mass removal rates and to assess the benefits of these modifications over the short and long term
- Pilot study work plan submitted to EPA on 30 June 2015
- Implementation will begin in December 2015
  - 5 SCRWs will be re-developed, and one SCRW will be brought back online in December.
  - Flow rate adjustments will begin in January.

---

# System Upgrades and Pipeline Realignment

- Purpose is to optimize operation of the existing groundwater treatment plants
- Proposed to EPA in two letters dated 27 July 2015
  - South 101 System upgrades:
    - Installation of larger groundwater transfer tank
    - Installation of dual groundwater transfer pumps
    - Enlargement of treatment pad collection sump
    - Associated upgrades to system controls
  - Fairchild System 1 and System 3 pipeline realignment
    - Consolidate flow of System 1 and System 3 to South 101 pad for treatment
    - No change to groundwater extraction rates

---

# System Upgrades and Pipeline Realignment

- EPA approved both letters on 2 September 2015
- Work progress to date:
  - September/October 2015 – construction activities related to South 101 upgrades and pipeline realignment completed
  - November 2015 – startup following completion of construction activities
- EPA notified on 19 November 2015 that construction and testing are complete
  - System 1, System 3, and South 101 extraction networks now flow to upgraded South 101 plant

---

# System Upgrades and Pipeline Realignment

- **Planned future work:**
  - Update as-built drawings and O&M manual for combined system
  - Decommission above-ground components of System 1 and System 3 in 2016

---

# Regional Groundwater Remediation Program (RGRP) Update Middlefield-Ellis-Whisman (MEW) Area

EPA All Parties Meeting  
2 December 2015



EPA-R9-2017-003246\_0000034

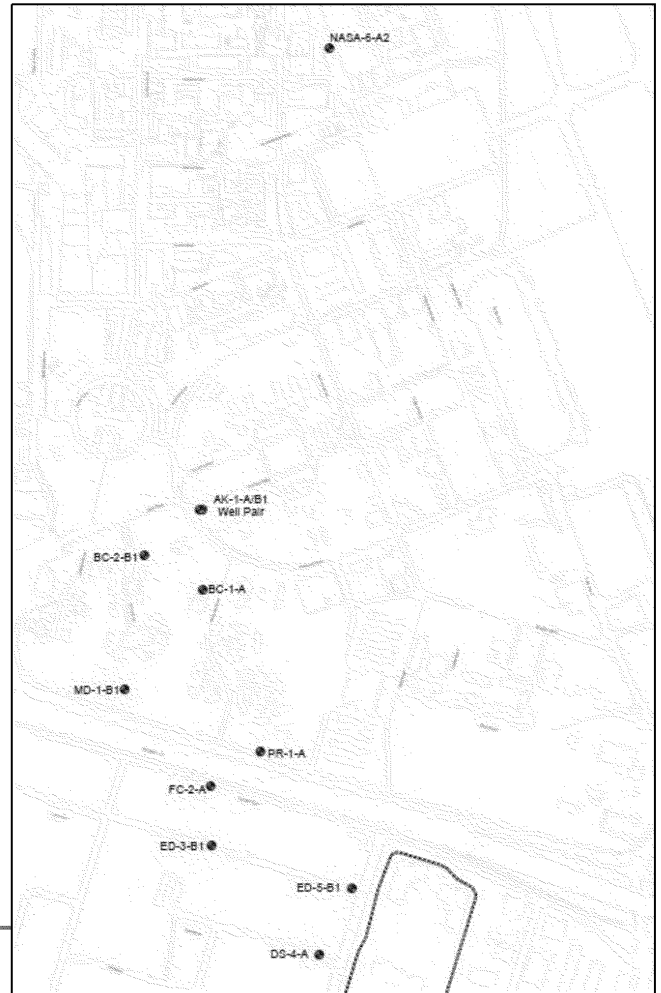
---

# Topics

- ❑ RGRP Monitoring Well Installation
- ❑ 600 National Sub Slab Depressurization (SSD) System
- ❑ 277 Fairchild Drive

# RGRP Monitoring Well Installations

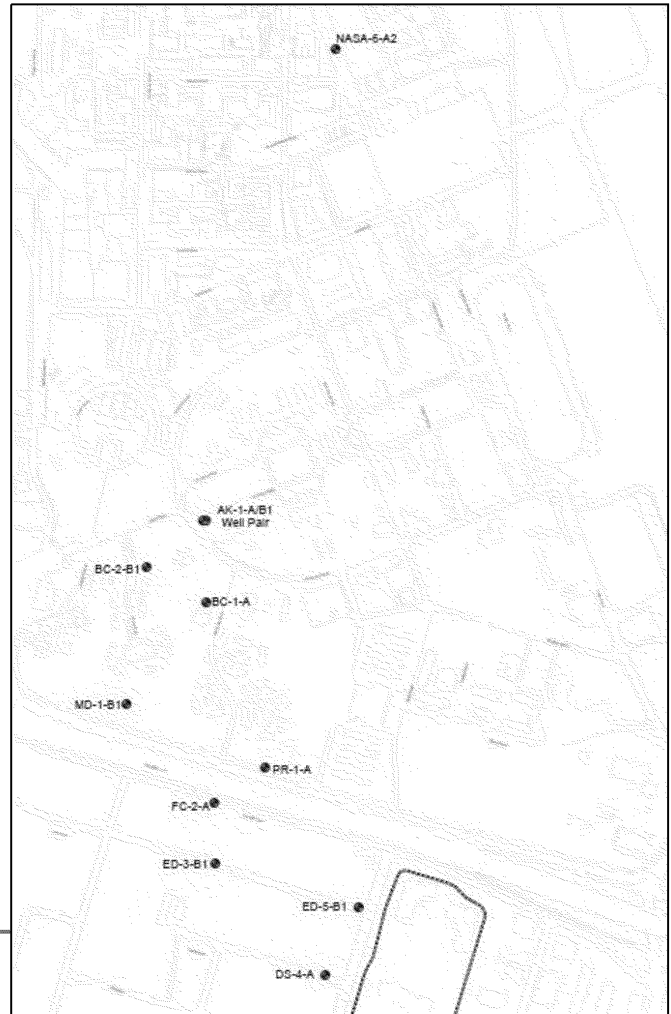
- Work completed in accordance with the *Final Grab Groundwater Assessment and Proposed Well Installations* report submitted to EPA on 13 September 2013
- Proposed new wells
  - 5 A zone wells
  - 6 B zone wells
- Wells north of Highway 101 installed in 2014





# RGRP Monitoring Well Installations

- Wells south of Highway 101 installed on 26 and 27 January 2015
- Wells sampled quarterly through March 2016, in accordance with MEW regional monitoring program after
- Well installation report submitted on 3 April 2015
- Analytical results will be presented in the 2015 RGRP Annual Progress Report



---

# 600 National SSD System

- August 2015 – Completed first phase of construction, including installation of:
  - Sub-slab extraction and monitoring piping
  - Vapor barrier
  - Extraction piping from the building to the treatment system area
- Planned future work:
  - Spring 2016 – complete SSD system construction
  - Summer 2016 (tentative) – system startup/initial monitoring
  - Long-term operation, maintenance, and monitoring

---

## 277 Fairchild Drive

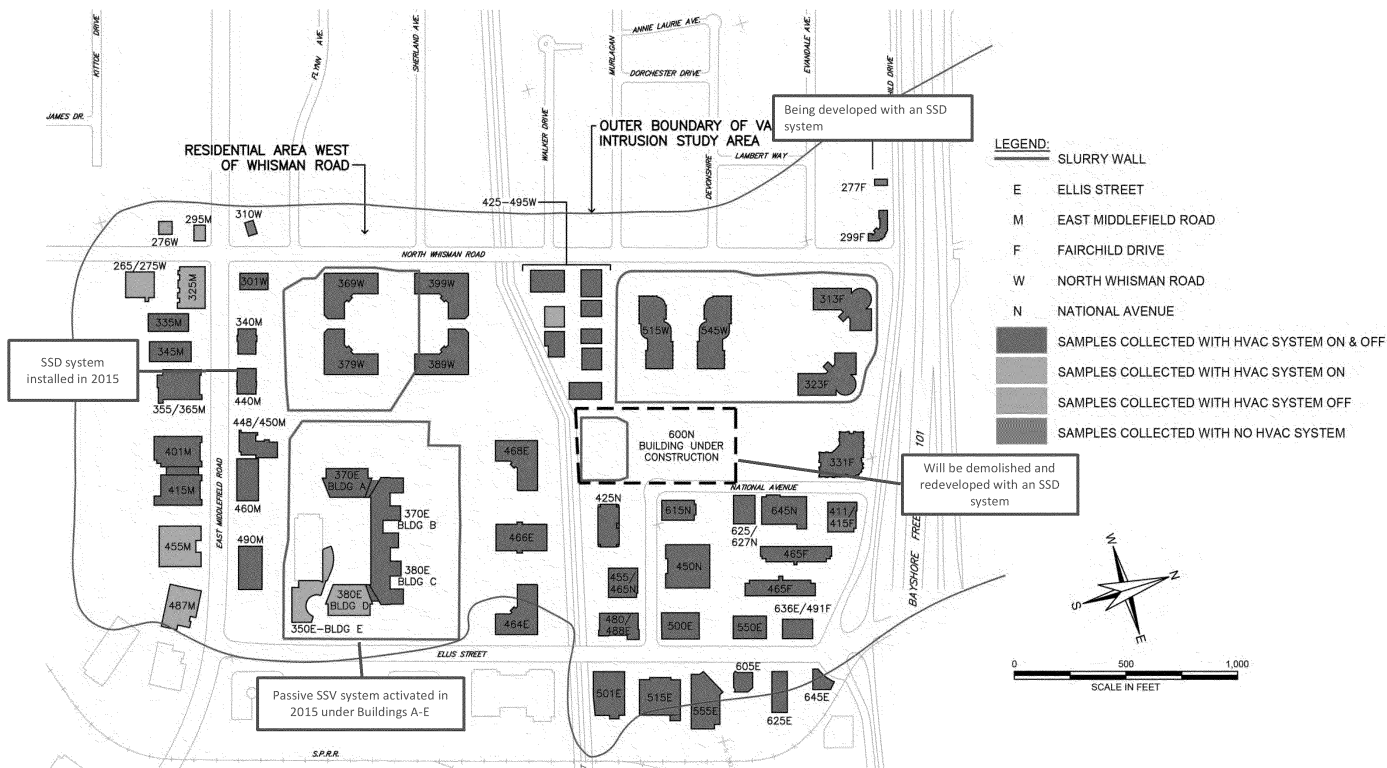
- Property is currently slated for redevelopment
  - Construction to begin in 2016
  - Single family dwellings and townhouses
- Remediation infrastructure will be constructed concurrent with redevelopment, including:
  - Sub-slab depressurization systems for residences
  - One new A-zone extraction well
- Timeline for remediation infrastructure construction and startup dependent on redevelopment schedule

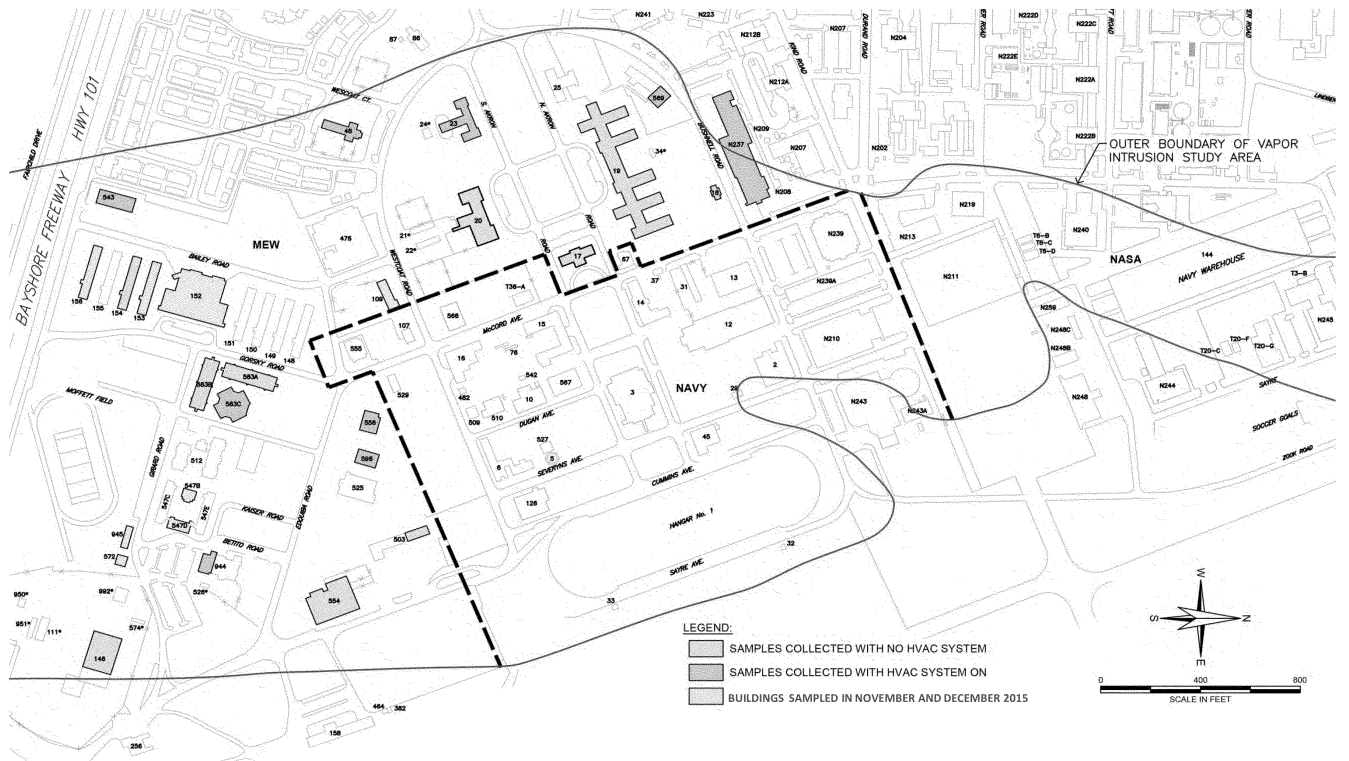
# MEW VI Work Update

Regional Program  
2 December 2015

**HALEY  
ALDRICH**

EPA-R9-2017-003246\_0000040

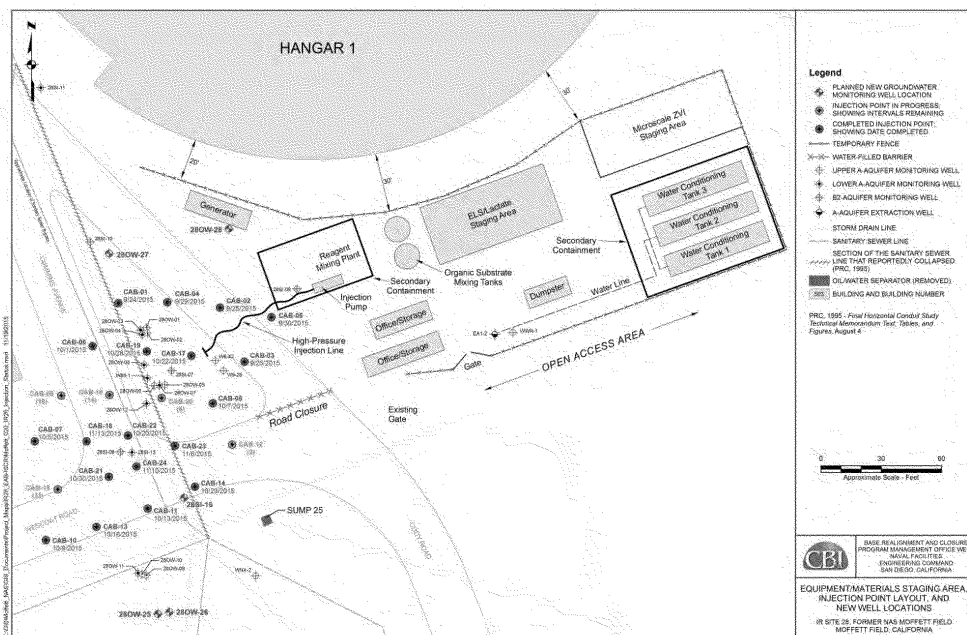




## Update

- ☐ Waiting for EPA's comments on 22 March 2013 Revised Tiering Work Plan;
- ☐ Buildings 20, 109, 152, 153, 156, 547B, 547D, 572, and 945 on Moffett Field have been or will be sampled in 2015;
- ☐ Installed and currently operating an active SSD system at 440 East Middlefield Road;
- ☐ 600 National Avenue Property being redeveloped with an active SSD system; and
- ☐ 277 Fairchild Drive property is vacant, will be demolished for residential use, and an active SSD system will be designed and constructed.

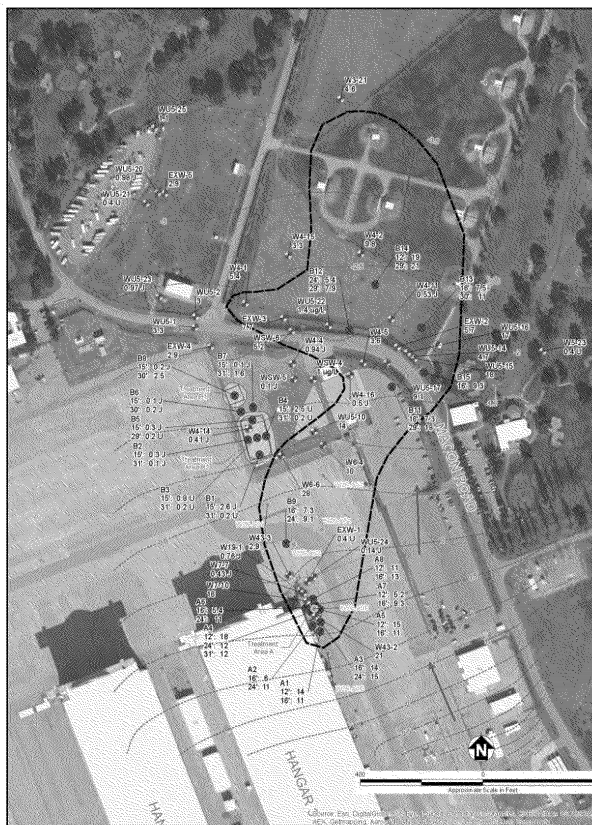
# IR Site 28



- 19 injection locations completed through November
- 5 injections incomplete due to unresolvable surfacing issues, despite modifying injection techniques, etc.
- Demobilized the site in November to allow the formation to settle
- Plan to return in January to attempt to complete remaining injection locations
- Initial round of groundwater sampling conducted in November to begin performance monitoring



## IR Site 26



- 10 monitoring wells total will be installed in Treatment Area A (NE corner of Hanger 3)
- No wells proposed for Treatment Area B (former wastewater holding ponds near well W4-14) due to sampling results indicating reducing conditions are occurring and VOC levels are low
- 4 shallow wells and 4 mid-depth wells will be installed in the source area
- One shallow well will be installed upgradient of Treatment Area A
- One deep well to be installed in Treatment Area A
- Path forward based on the 2014 ROD Amendment is implementation of Land Use Controls (LUCs), enhanced in-situ bioremediation, and monitored natural attenuation (MNA)

### Legend

- Proposed Deep Well (45 - 50 feet)
- Proposed Nested Well (8 - 18 feet), (18 - 28 feet)
- Proposed Upgradient Well (10 - 20 feet)
- TCE Results - 2014 Groundwater Monitoring Program (GMP) Event
- TCE Results - Existing Wells (August, 2015)
- TCE Results - Direct Push Sampling (August, 2015)
- 2014 Groundwater Potentiometric Surface (ft msl)
- Approximate Extent of TCE above MCL
- Former Flux Ponds
- Former Waste Water-Holding Ponds
- Groundwater Flow Direction

NOTE: All reported concentrations are in micrograms per liter (ug/L).

## **WATS and Base-wide Groundwater Monitoring**



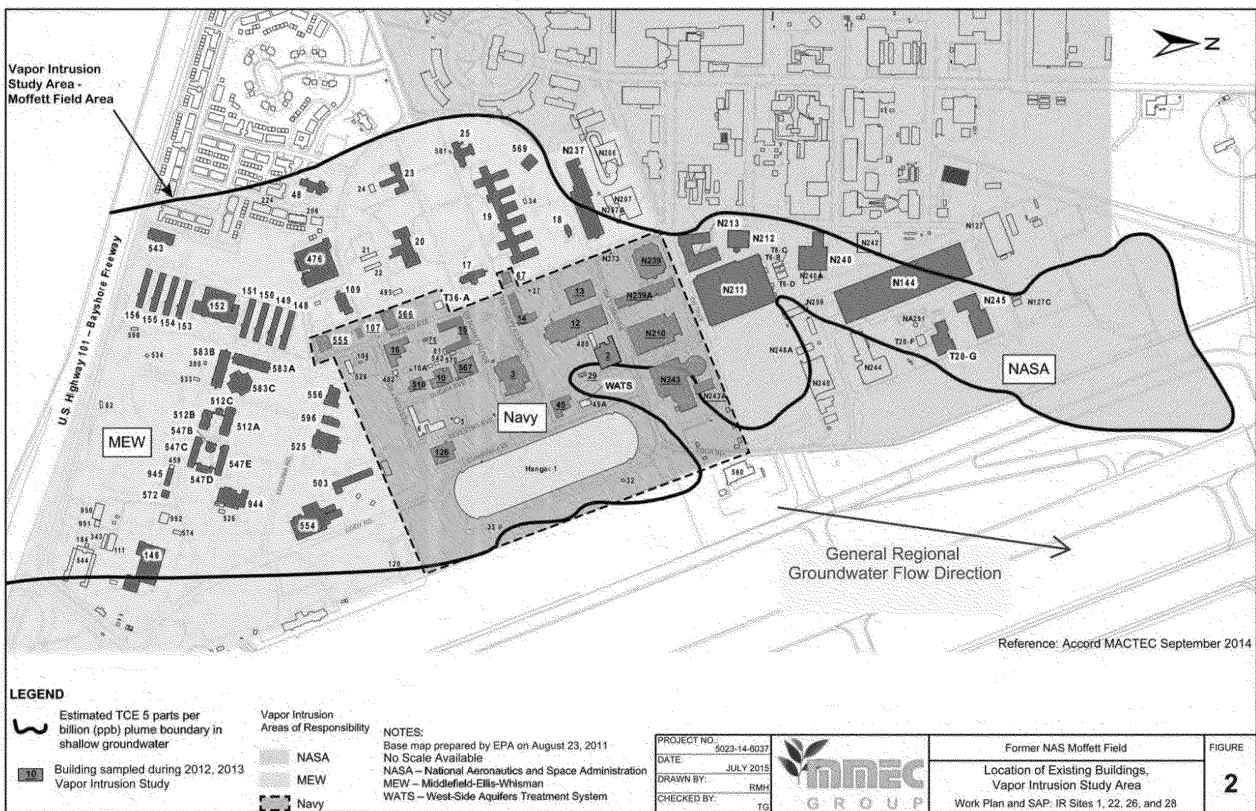
- The Navy continues conducting regular maintenance and National Pollution Discharge Elimination System (NPDES) sampling as needed. All extraction wells are currently on-line and operating. The Third Quarter 2015 NPDES Self-Monitoring Report for WATS was uploaded to the GeoTracker website on October 29, 2015.
- Hangar #1 storm drains and catch basins were checked on October 29<sup>th</sup>, 2015, but not enough sediment was present to sample. A recheck is scheduled for November.
- Semiannual base-wide groundwater gauging and annual groundwater sampling occurred in September and October 2015. A Draft 2015 Annual Groundwater Monitoring Report will be available in February 2016.


## IR Site 28 Vapor Intrusion



- Ongoing VI air monitoring for 23 buildings in Navy area of responsibility (see figure on Slide 2)
- Building 10 draft Remedial Design for VI (out for review and comments, November 2015)
- Preparing Internal Draft VI Mitigation measures Work Plan for Buildings 10, 16, 126, N210, N239, N239A

# IR Site 28 Vapor Intrusion





**355/365 & 401 E. Middlefield Rd  
("Lots 3 & 4")  
Middlefield-Ellis-Whisman Site  
Mountain View, CA**

All Parties Meeting  
December 2, 2015



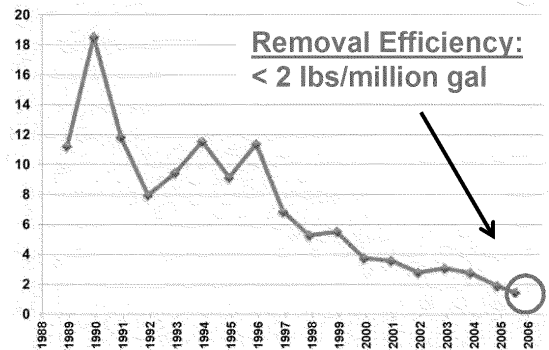
EPA-R9-2017-003246\_0000049

# Site Location



# Site Remediation History

- **1982 – 1984:**
  - P&T (27 Mgal/~1,600 lbs VOCs)
  - Source Removal (4,000 cubic yds)
- **1986-2005:**
  - P&T (51 Mgal/364 lbs VOCs)
- **2005-present:**
  - P&T suspended
  - **ERD:** In-situ Enhanced Reductive Dechlorination (carbon substrate + bioaugmentation) & Monitoring





# In-situ ERD: Phases I and II



## Phase II Area:

- 20 Injection Wells
- Electron donor injections 2006, 2009 & 2010
- Bioaugmentation 2006

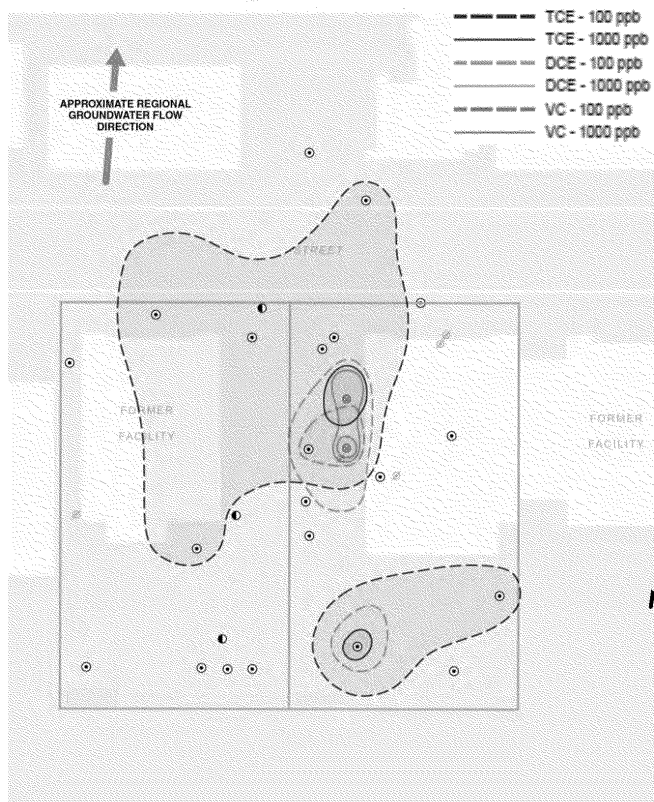
## Phase I Area:

- 15 Injection Wells
- Electron donor injections 2005, 2009, 2010 & 2014
- Bioaugmentation 2010 & 2014



# Plume Reduction by ERD/MNA in A-zone

JANUARY 2004



OCTOBER 2013

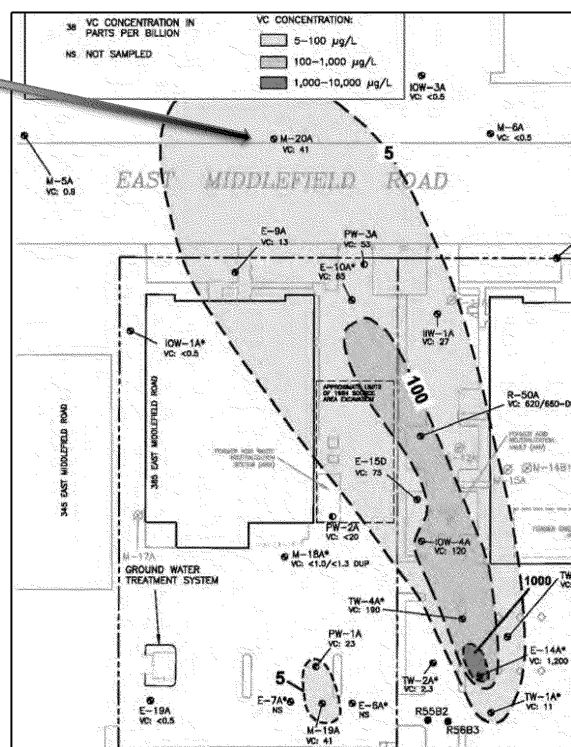
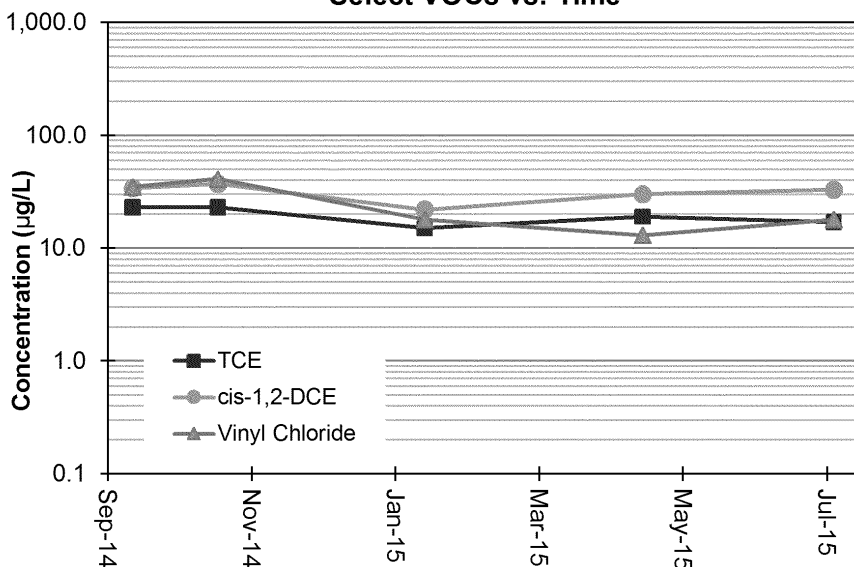


N

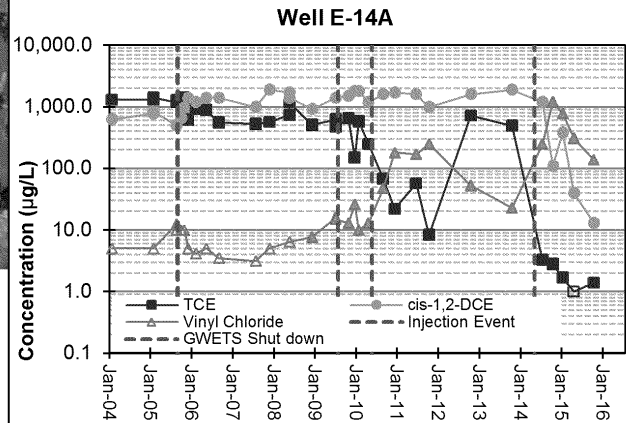
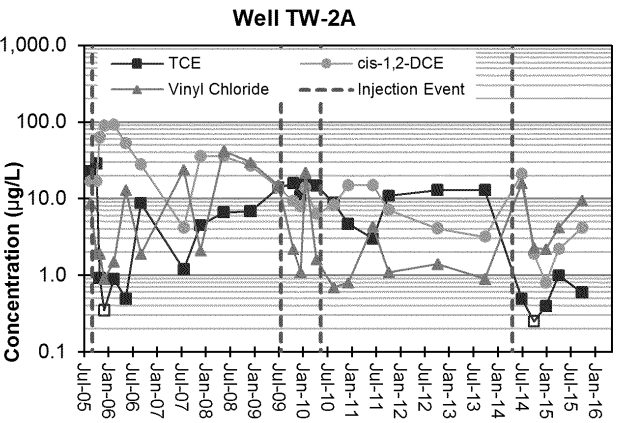
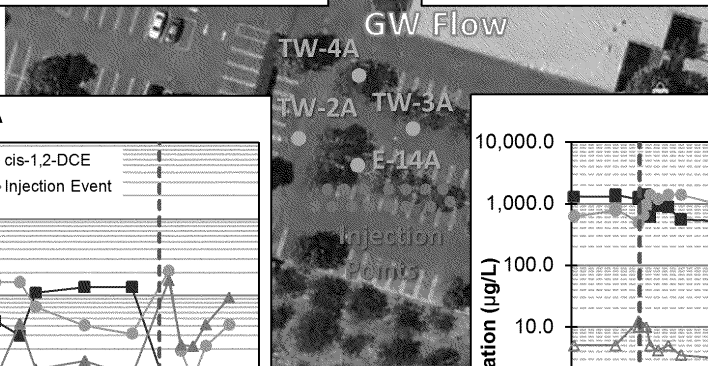
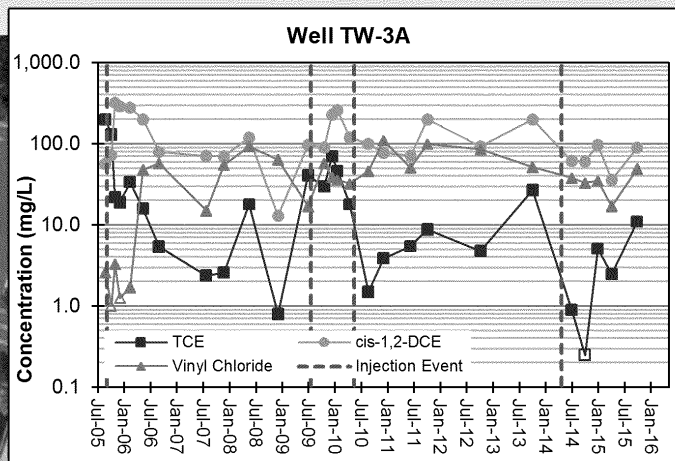
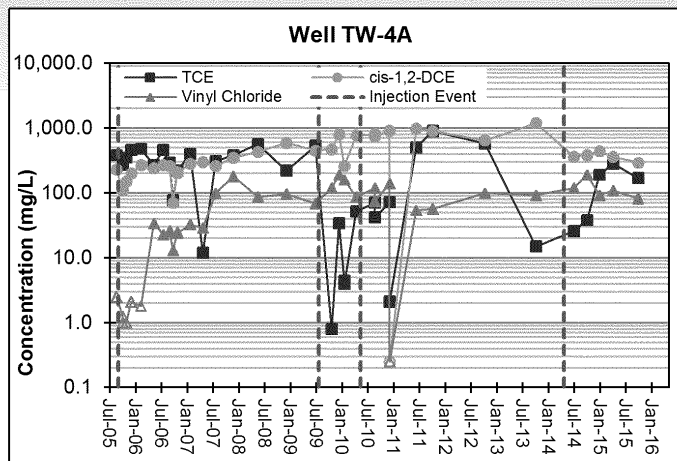
5

# New A-zone Monitoring Well M-20A

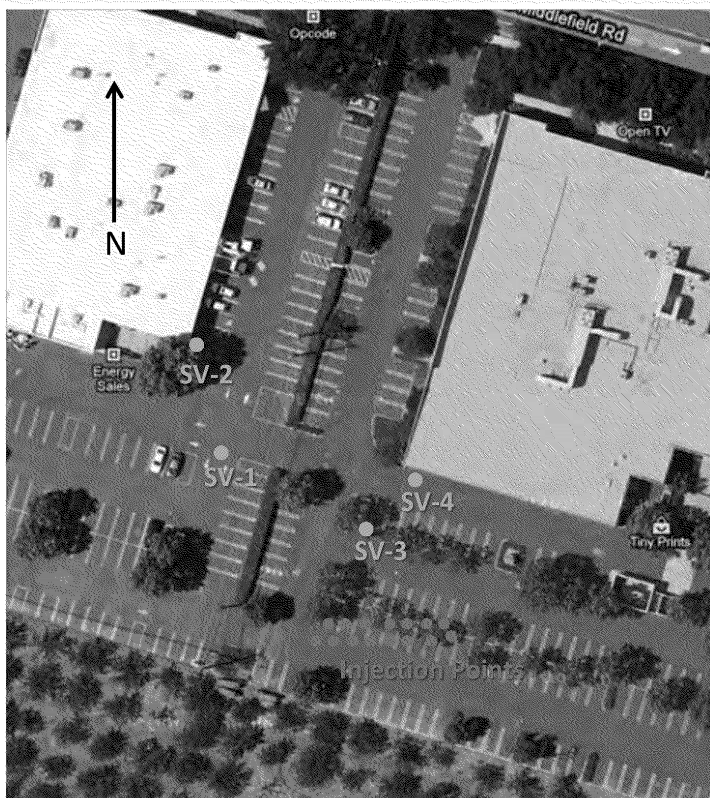
**Well M-20A**  
Select VOCs vs. Time



# In-situ ERD: Phase 1 Area Groundwater Monitoring



# In-situ ERD: Soil Vapor Monitoring

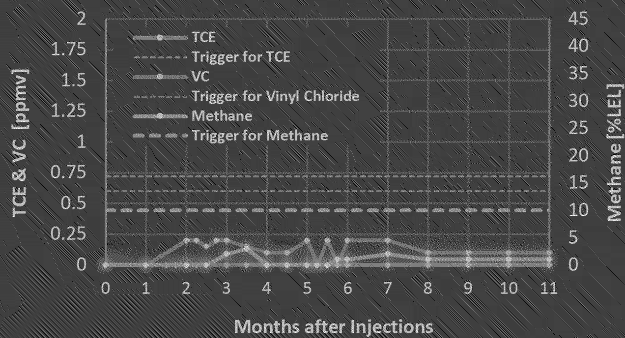


## □ Soil Vapor Probes (SV):

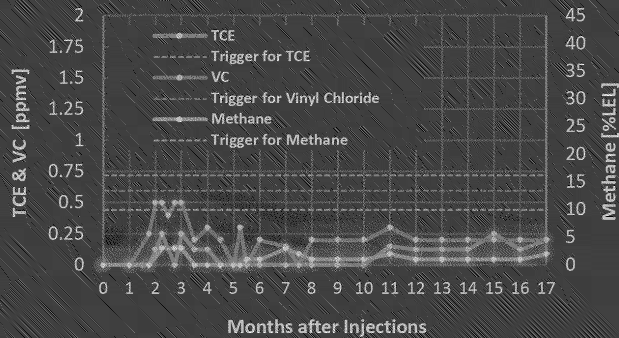
- Installation depth: 5 feet bgs
- Monitor TCE, cis-DCE, VC and methane by GasTech tubes, PID and LEL meter (following laboratory confirmation)
- Monitoring started 1 month after donor injections

# Monitoring Results for First 17 Months

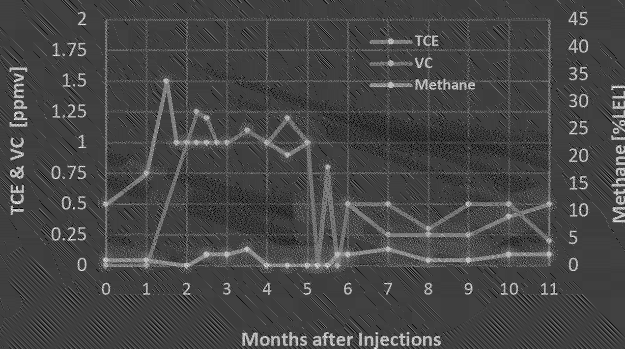
Soil Vapor Probe SV-2



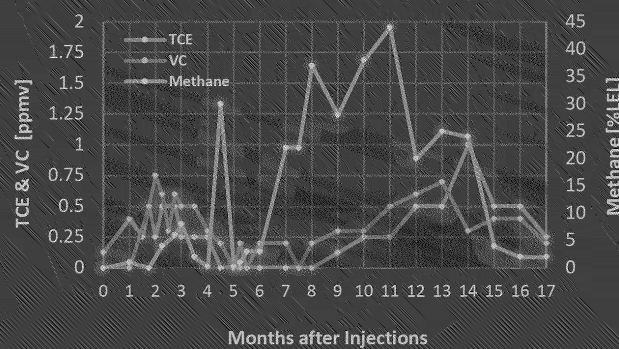
Soil Vapor Probe SV-4



Soil Vapor Probe SV-1



Soil Vapor Probe SV-3



## Current Site Status

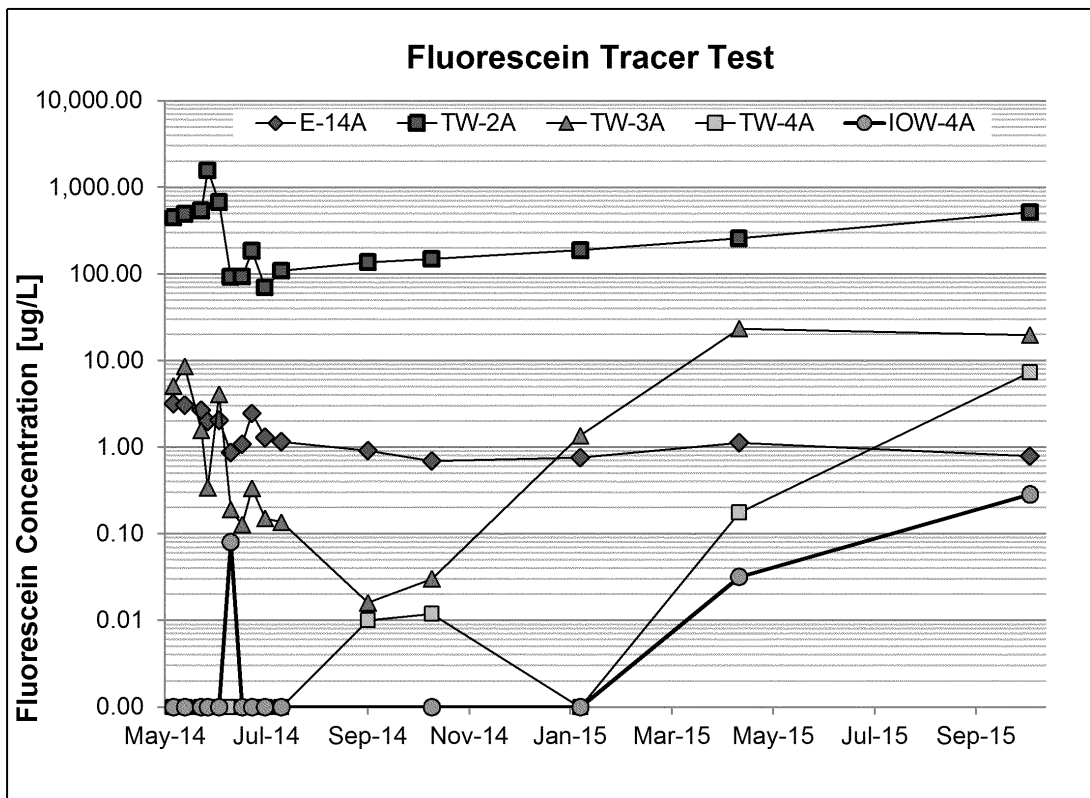
- **ERD has been very effective and plume appears to be shrinking**
- **Vapor intrusion status**
  - Previously completed sampling indicated Tier 3A status
  - Monitoring during ERD confirmed no issues

## Extra slides

- **Tracer results**



# In-situ ERD: Groundwater Tracer Test



## Estimated GW velocity:

~120 ft/yr (based on FL response observed in TW-2A, TW-3A & IOW-4)

